Hi-Mill Mfg. Co.
161626 10/5/88

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V

IN THE MATTER OF: HI-MILL MANUFACTURING CO. 1704 E. Highland Highland, Michigan 48031, RESPONDENT, Proceeding under Section 122(a) and (d)(3) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended.	ADMINISTRATIVE ORDER BY CONSENT RE: REMEDIAL INVESTIGATION AND FEASIBILITY STUDY U.S. EPA Docket No. V-W- '88-C-127

The United States Environmental Protection Agency ("U.S.EPA"), and the Respondent have each agreed to the making and entry of this Administrative Order by Consent ("Consent Order").

I. JURISDICTION

A. This Consent Order is issued pursuant to the authority vested in the President of the United States by Section 122(a) and (d)(3) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. Section 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986, Pub. L. 99-499 (SARA), and delegated to the Administrator of the U.S. EPA on January 29, 1987, by Executive Order 12580, 52 Fed. Reg. 2923, and delegated to the U.S. EPA Region V Regional Administrator under U.S. EPA Interim Delegation No. 14-14-C, which was signed

February 26, 1987, and further delegated to the U.S. EPA Region V Waste Management Division Director on September 14, 1987.

B. The Respondent to this Consent Order agrees to undertake all actions required by the terms and conditions hereunder, and consents to and will not contest or legally challenge the issuance of this Consent Order or the U.S. EPA's jurisdiction regarding this Consent Order.

C. The U.S. EPA and the Respondent agree that nothing in the Consent Order nor the fact that it is being entered into shall constitute any admission of fact or conclusion of law aside from those expressly stated herein.

II. NOTICE OF ACTION

A. U.S. EPA has notified all potentially responsible parties that it has identified as of the date of entry of this Consent Order of this action and has provided them with the names and addresses of potentially responsible parties pursuant to Section 122(e) of SARA.

B. U.S. EPA has notified the Federal Natural Resource trustee of this action pursuant to the requirements of Section 122(j) of SARA.

C. U.S. EPA has notified the State of Michigan of this action pursuant to the requirements of Section 121(f) of SARA.

D. On June 28, 1988, the U.S. EPA sent to the Respondent a letter notifying the Respondent of its potential liability under Section 107(a) of SARA with regard to undertaking this Remedial Investigation and Feasibility Study (RI/FS).

III. PARTIES BOUND

A. This Consent Order applies to and binds the following persons as defined in Section 101(21) of SARA:

(1) U.S. EPA, through the Waste Management Division Director, Region V;
(2) Hi-Mill Manufacturing Co., herein referred to as the "Respondent;" and
(3) the officers, employees, agents, subsidiaries, successors and assignees of the Respondent.

B. The undersigned representative of the U.S. EPA and the Respondent certifies that he or she is fully authorized to enter into the terms and conditions of this Consent Order and to execute and legally bind such party to this document.

C. No change in ownership, corporate, or partnership status shall in any way alter the status or responsibility of the Respondent under this Consent Order. The Respondent shall be responsible for carrying out all actions required of the Respondent by the terms and conditions of this Consent Order.

The Respondent shall provide a copy of this Consent Order to each contractor, subcontractor, laboratory, consultant or firm retained to perform the activities contemplated by this Consent Order, or any other person or entity acting under or for them with respect to matters included herein, and shall condition any contract for performance of work on compliance with the terms and provisions of this Consent Order. Any contractor retained by the Respondent shall be instructed by the Respondent to provide a copy of this Consent Order to any subcontractor retained to perform work required by this Consent Order, and to condition any contract for performance of work on compliance with the terms and provisions of this Consent Order. The failure of any contractor, consultant firm or other person or entity acting under or for Respondent with respect to matters included in this Consent Order to fully comply with the terms of this Consent Order will not relieve the Respondent of its responsiblity to carry out all actions required of the Respondent by the terms and conditions of this Consent Order, will not provide a defense to any assertion of a right by U.S. EPA under this Consent Order or otherwise, and will not be considered cause for delay.

IV. STATEMENT OF PURPOSE

A. In entering into this Consent Order, the mutual objectives of the U.S. EPA and the Respondent are for the Respondent: (1) to conduct a remedial investigation (RI) to determine fully the nature and extent of the release or

threatened release of hazardous substances, pollutants or contaminants from the Facility, if any, and (2) to perform a feasibility study (FS) to identify and evaluate alternatives for the appropriate extent of remedial action to prevent or mitigate the migration or the release or threatened release of hazardous substances, pollutants, or contaminants, if any, from the Facility.

B. The activities conducted pursuant to this Consent Order are subject to approval by the U.S. EPA as provided, shall employ sound scientific, engineering and construction practices and shall be consistent with the National Contingency Plan, 40 CFR 300.68(a)-(j) (47 Federal Register 31180 (July 16, 1982), revised at 50 Federal Register 47912 (November 20, 1985)) as amended, and the Superfund Amendments and Reauthorization Act of 1986.

V. FINDINGS OF FACT

Based upon information available on the effective date of this Consent Order, the Waste Management Division Director of the U.S. EPA, Region V, makes the following findings:

A. Hi-Mill Manufacturing Company (hereinafter the "Facility") is located at 1704 E. Highland, Highland, Michigan.

B. Facility operations may have resulted in heavy metal contamination of the groundwater surrounding the Facility, and of the sediments and surface water at the adjacent Highland Recreation Area marshland.

C. Based upon investigations by the Michigan Department of Natural Resources, elevated levels of hazardous substances as defined in Section 101(14) of SARA are located at the facility, the marsh, and in the groundwater surrounding the facility, including, but not limited to, the following: Chromium, Nickel, Zinc and Lead.

D. Residences and businesses within three (3) miles of the facility are supplied with water from groundwater sources.

E. The City of Highland, Michigan, is located approximately 1.5 miles west of the facility.

F. The Respondent is the current owner and operator of the facility and was, to the best of its knowledge, the owner and operator of the facility during all relevant times within the meaning of Section 101(20) of SARA and is therefore a "liable person" pursuant to Sections 107(1)-(3) of SARA.

G. Based on the results of U.S. EPA and MDNR investigations to date and taking into account such factors as populations at risk, the potential of hazardous substances being present, the potential for contamination of drinking water supplies and the destruction of sensitive ecosystems, the facility was proposed for the National Priorities List ("NPL") pursuant to Section 105 of SARA. See 40 C.F.R. Part 300, appendix B, and 53 Federal Register 23988 (June 24, 1988).

VI. CONCLUSIONS OF LAW

Based upon information available on the effective date of this Consent Order, the Regional Administrator of the U.S. EPA, Region V, makes the following conclusions of law:

A. Hi-Mill Manufacturing Co. is a "facility" as defined in Section 101(9) of SARA.

B. From 1946 to the present "hazardous substances" as defined in Section 101(14) of SARA were deposited, stored, disposed of, placed, or located at the Facility, and there has been a "release" or "threat of release" of hazardous substances at the Facility within the meaning of Section 104(a) of SARA.

C. The Respondent is a "person" as defined in Section 101(21) of SARA.

D. The Respondent is a liable person pursuant to Section 107 of SARA and a potentially responsible party for the purposes of Section 122 of SARA for the reasons set forth in Section V of this Consent Order.

VII. DETERMINATIONS

Based on the foregoing Findings of Fact and Conclusions of Law, the Regional Administrator of U.S. EPA, Region V, has determined that:

A. The Respondent will promptly and properly take appropriate response action at the Facility by conducting a Remedial Investigation and Feasibility Study ("RI/FS") and is qualified to perform the RI/FS; and

B. The actions required by this Consent Order are in the public interest and are consistent with the National Contingency Plan, 40 CFR Part 300, as amended, and with the Superfund Amendments and Reauthorization Act of 1986.

VIII. WORK TO BE PERFORMED

A. All work to be performed by the Respondent pursuant to this Consent Order shall be under the direction and supervision of a qualified professional engineer or certified geologist with expertise in hazardous waste site investigation. Prior to the

initiation of work at the Facility, the Respondent shall notify the U.S. EPA, in writing, of the name, title, and qualifications of the proposed engineer or geologist, and of the names of principal contractors and/or subcontractors proposed to be used in carrying out the work to be performed pursuant to this Consent Order. Selection of any such engineer or geologist or contractor and/or subcontractor shall be subject to approval by the U.S. EPA.

B. Attachment I to this Consent Order provides a Statement of Work ("SOW"), for the completion of the RI/FS which is incorporated into and made a part of this Consent Order.

C. The following work shall be performed:

1. Within Sixty (60) calendar days of the effective date of this Consent Order, the Respondent shall submit a work plan to U.S. EPA for a complete Remedial Investigation and Feasibility Study Work Plan (hereinafter RI/FS Work Plan). The RI/FS Work Plan shall be developed in conformance with the attached SOW, the standards set forth in Section 121 of CERCLA, U.S. EPA "Guidance on Remedial Investigations Under CERCLA" dated May 1985, as amended (the "RI Guidance") and U.S. EPA "Guidance on Feasibility Studies Under CERCLA," dated April 1985, as amended (the "FS Guidance"), and any additional

guidance documents provided to the Respondent by U.S. EPA, provided that in the event that any such additional guidance document is provided to the Respondent by U.S. EPA after the effective date of this Consent Order, the Respondent shall have fifteen (15) calendar days to revise the Work Plan as necessary, and any time limits provided in this Consent Order shall be extended as necessary to accomodate said (15) day period.

2. The RI/FS Work Plan submittal shall include the following project plans: (1) a sampling plan; (2) a health and safety plan; (3) a plan for satisfaction of permitting requirements; (4) a quality assurance project plan; (5) provisions for the preparation of an endangerment assessment plan; (6) a schedule for implementation of all tasks set forth in the RI/FS Work Plan and consistent with the time frames set forth in Section IX; and (7) a schedule for submission of deliverables such as technical memoranda, preliminary and final RI reports, preliminary and final endangerment assessments, and preliminary and final FS reports. The RI/FS Work Plan shall provide, at a minimum, for the submittal of a preliminary and final Remedial Investigation Report, to be prepared in accordance with the RI guidance, and a preliminary and final Feasibility Study Report, to be prepared in accordance with the FS Guidance.

3. The RI/FS Work Plan shall be subject to review, modification, and approval by the U.S. EPA.

4. Within 45 calendar days of receipt of the RI/FS Work Plan, the U.S. EPA Project Coordinator shall notify the Respondents, in writing, of approval or disapproval of the RI/FS Work Plan, or any part thereof. In the event that a longer review period is required, the U.S. EPA Project Coordinator shall notify the Respondents of that fact within 30 calendar days of receipt of the Work Plan. In the event of any disapproval, the U.S. EPA shall specify, in writing, any deficiencies and required modifications to the RI/FS Work Plan.

5. Within 15 calendar days of receipt of any U.S. EPA RI/FS Work Plan disapproval, the Respondents shall submit a revised RI/FS Work Plan to the U.S. EPA which incorporates the U.S. EPA modifications.

6. In the event of subsequent U.S. EPA disapproval of the RI/FS Work Plan, the U.S. EPA retains the right to conduct a complete RI/FS and/or to enforce the terms of this Consent Order.

7. The Respondent shall proceed promptly to implement the work detailed in the RI/FS Work Plan if and when the RI/FS Work Plan is fully approved by the U.S. EPA. Unless otherwise directed by U.S. EPA, the Respondent shall not commence field activities until approval by the U.S. EPA of the RI/FS Work Plan. The fully approved RI/FS Work Plan shall be deemed incorporated into and made an enforceable part of this Consent Order. All work shall be conducted in accordance with the National Contingency Plan, the RI Guidance and the FS Guidance and the requirements of this Consent Order, including the standards, specifications and schedule contained in the RI/FS Work Plan.

IX. PLANS AND REPORTS

A. The Respondent shall provide a preliminary and final Remedial Investigation Report and Feasibility Study Report and any other plans or reports required by the RI/FS Work Plan to the U.S. EPA according to the schedules contained in this Consent Order and in the approved RI/FS Work Plan. The Respondent shall submit to U.S. EPA the preliminary RI Report and preliminary endangerment assessment within ninety (90) days of completion of the RI field work. The Respondent shall submit to U.S. EPA the preliminary FS within sixty (60) days of U.S. EPA approval of the RI Report.

B. The U.S. EPA shall review and approve the preliminary and final Remedial Investigation Report, the preliminary and final Feasibility Study Report and any other preliminary or final plans or reports specified in the RI/FS Work Plan as requiring U.S. EPA approval.

C. If the U.S. EPA disapproves any preliminary or final plan or report, the U.S. EPA shall specify, in writing, any deficiencies and required modifications and the Respondent shall submit a revised plan or report to the U.S. EPA within 45 calendar days or such longer period as the U.S. EPA Project Coordinator may establish, which revised plan or report shall incorporate any U.S. EPA modifications or additions.

D. In the event of subsequent disapproval of any revised plan or report, the U.S. EPA retains the right to amend such plan or report, to perform additional studies, to conduct a complete or partial RI/FS, to seek reimbursement from the Respondent thereafter for such costs incurred by the U.S. EPA and/or to enforce the terms of this Consent Order. Except as otherwise provided, the U.S. EPA shall not take such action without first providing the Respondent ten (10) calendar days from the date the Respondent is notified of such disapproval to submit an acceptable plan or report.

E. The Respondent shall provide monthly written progress reports to the U.S. EPA according to the schedule contained in the RI/FS Work Plan. At a minimum, these monthly written progress reports shall include the following:

1. A description of the action which has been taken toward achieving compliance with this Consent Order;

2. All results of sampling and tests and all other raw data produced during the month and relating to the Facility;

3. All plans and procedures completed during the past month, as well as such actions, data and plans which are scheduled for the next month; and

4. Target and actual completion dates for each element of activity, including the project completion, and an explanation of any deviation from the schedules in the RI/FS Work Plan schedule.

F. The monthly written progress reports shall be submitted to the U.S. EPA by the tenth (10th) business day of each month following the date of commencement of the work detailed in the RI/FS Work Plan.

X. ADDRESS FOR ALL CORRESPONDENCE

Documents, including reports, approvals, disapprovals and other correspondences to be submitted pursuant to this Consent Order shall be sent by certified mail to the following addresses, or to such other addresses as the Respondent or the U.S. EPA may hereafter designate in writing:

A. Documents to be submitted to the U.S. EPA should be sent to:

Angela M. Porter
Hi-Mill Manufacturing Company
Remedial Project Manager
Remedial Enforcement Response Branch (5HR-11)
U.S. Environmental Protection Agency
Region V
230 S. Dearborn Street
Chicago, Illinois 60604

B. Documents to be submitted to the Michigan Department of Natural Resources should be sent to the Hi-Mill Manufacturing Company Site Project Officer, Michigan Department of Natural Resources, at an address to be provided.

C. Documents to be submitted to the Respondent should be sent to:

Hi-Mill Manufacturing Company
1704 E. Highland
Highland, Michigan 48031

Jack D. Shumate
BUTZEL, LONG, GUST, KLEIN & VAN ZILE
1650 First National Building
Detroit, Michigan 48226
Attn: Jack D. Shumate or Robert Davis

Dr. James Harless
Techna Corporation
P.O. Box 1087
Ann Arbor, Michigan 48106

XI. ADDITIONAL WORK

A. In the event that the U.S. EPA or the Respondent determines that additional work, including remedial investigatory work and/or engineering evaluation, is necessary to accomplish the objectives of the RI/FS, notification of such additional work shall be provided to each of the other parties.

B. Any additional work determined to be necessary by the Respondent shall be subject to approval by the U.S. EPA.

C. Any additional work determined to be necessary by the Respondent and approved by the U.S. EPA, or determined to be necessary by the U.S. EPA, shall be completed by the Respondent in accordance with the standards, specifications, and schedule determined or approved by the U.S. EPA.

D. In the event that the Respondent declines to perform any additional and/or modified tasks, U.S. EPA retains the right to undertake such tasks and to seek reimbursement from the Respondent for such costs incurred by the United States.

XII. COMPLIANCE WITH APPLICABLE LAWS

All work undertaken by the Respondent pursuant to this Consent Order shall be performed in compliance with all applicable Federal and State laws and regulations, including all Occupational Health and Safety Administration and Department of Transportation regulations. The Respondent shall be responsible for obtaining all State or local permits which are necessary for the performance of any work hereunder.

XIII. ACCESS

A. To the extent that the Facility or other areas where work is to be performed hereunder is presently owned by parties other than those bound by this Consent Order, the Respondents shall obtain, or shall use their best efforts to obtain, access agreements from the present owners within thirty (30) calendar days of approval of the RI/FS Work Plan. Such agreements shall provide access for the U.S. EPA, and authorized representatives of the U.S. EPA, as specified below. In the event that such access agreements are not obtained within the time referenced above, the Respondents shall so notify the U.S. EPA. If, despite Respondent's best efforts to obtain access under this provision, Respondent is unable to obtain access necessary to carry out the terms of this Consent Order, U.S. EPA, Region V agrees to recommend that the Agency's authority under Section 104(e) of SARA be exercised to secure such access on behalf of Respondent. This agreement shall be subject to the following: (1) Agency guidance, including, but not limited to guidance entitled "Entry and Continued guidance Under CERCLA," dated June 5, 1987; (2) consultation with the U.S. EPA's Office of Enforcement and, to the extent necessary, concurrence by the Department of Justice; and (3) agreement by the Respondent to cooperate with U.S. EPA in the exercise of this authority. Respondent is advised that the expenses incurred by the United States in gaining access are response costs for which the

Respondent may be liable. U.S. EPA reserves the right to terminate this Consent Order should the inability to gain access materially affect the Respondent's ability to perform work herein in which case Respondent's obligations hereunder should cease.

B. Authorized representatives of the U.S. EPA shall be allowed access to the Facility and other areas by the Respondent, and as part of any agreement obtained under paragraph A above, for purposes including, but not limited to: inspecting records, operating logs and contracts related to the facility; reviewing the progress of the Respondents in carrying out the terms of this Consent Order; conducting such tests, inspections, and sampling as the U.S. EPA may deem necessary; using a camera, sound recording, or other documentary type equipment; and verifying the data submitted to the U.S. EPA by the Respondent hereunder. The Respondent shall permit such authorized representatives to inspect and copy all records, files, photographs, documents, and other writings, including all sampling and monitoring data, which pertains to this Consent Order, subject to Paragraph C of Article XV of this Consent Order. All persons with access to the Facility pursuant to the Consent Order shall comply with approved health and safety plans.

C. Nothing herein shall be construed as restricting the inspection or access authority of the U.S. EPA under any law or regulation.

XIV. PROJECT COORDINATORS

A. On or before the effective date of this Consent Order, the U.S. EPA and the Respondent shall each designate a Project Coordinator. Each Project Coordinator shall be responsible for overseeing the implementation of this Consent Order. The U.S. EPA Project Coordinator will be the U.S. EPA designated representative at the facility. To the maximum extent possible, communications between the Respondent and the U.S. EPA, and all documents, reports, approvals and other correspondences concerning the activities performed pursuant to the terms and conditions of this Consent Order, shall be directed through the Project Coordinators. During implementation of the RI/FS Work Plan, the Project Coordinators shall, whenever possible, operate by consensus and shall attempt in good faith to resolve disputes informally through discussion of the issues.

B. The U.S. EPA and the Respondents shall each have the right to change their respective Project Coordinators. Such a change shall be accomplished by notifying the other party in writing at least ten (10) calendar days prior to the change.

C. The U.S. EPA Project Coordinator shall have the authority vested in an On-Scene Coordinator and a Remedial Project Manager (OSC, RPM) by the National Contingency Plan, 40 CFR Part 300, as amended, including the authority to halt, conduct, or direct any work required by this Consent Order, or to direct any response action undertaken by the U.S. EPA when conditions at the facility may present an imminent and substantial endangerment to the public health or welfare or the environment. In the event that the U.S. EPA Project Coordinator halts work pursuant to this paragraph, the Respondent may request a modification of the schedule or work described in the RI/FS Work Plan and this Consent Order.

D. The absence of the U.S. EPA Project Coordinator from the Facility shall not be cause for stoppage of work.

E. The Project Coordinator for the Respondent or his designee shall be on-site during all hours of site work and shall be on call during the pendency of this Consent Order.

XV. SAMPLING AND DATA/DOCUMENT AVAILABILITY

A. The Respondent shall make the results of all sampling and/or tests or other data generated by the Respondent, or on behalf of the Respondent, pursuant to implementation of this

Consent Order, available to the U.S. EPA, and shall submit these results in written monthly progress reports as required by Section IX of this Consent Order.

B. At the request of the U.S. EPA, the Respondent shall provide split or duplicate samples to the U.S. EPA of any samples collected by the Respondent pursuant to the implementation of the Consent Order. The Respondent shall notify the U.S. EPA at least five (5) calendar days in advance of any sample collection activity, provided that if any scheduled sample is delayed as a result of a force majeure condition, the Respondent may proceed with such sample collection activity at a time and date to be agreed upon by the parties.

C. Pursuant to applicable Federal laws and regulations, (Section 104(e) of SARA and 40 CFR Part 2), the Respondent may assert a confidentiality claim with respect to any or all of the information requested or submitted pursuant to the terms of this Consent Order. Such an assertion must be adequately substantiated when the assertion is made. Analytical data and other information described in Section 104(e)(7)(F) of SARA shall not be claimed as confidential by the Respondent. Information determined to be confidential by the U.S. EPA in accordance with applicable federal laws and regulations will be

afforded the full protection provided by such laws and regulations. If no confidentiality claim accompanies information when it is submitted to the U.S. EPA, or if the information claimed as confidential is determined by the U.S. EPA not to be confidential, the information may be made available to the public by the U.S. EPA, in accordance with 40 CFR Part 2.

XVI. QUALITY ASSURANCE

A. The Respondent shall use quality assurance, quality control, and chain of custody procedures in accordance with the approved Quality Assurance Project Plan throughout all data collection activities.

B. The Respondent shall consult with the U.S. EPA Project Coordinator in planning for, and prior to, all sampling and analysis as detailed in the RI/FS Work Plan. In order to provide quality assurance and maintain quality control with respect to all samples collected pursuant to this Consent Order, the Respondent shall:

1. Ensure that the U.S. EPA personnel and/or the U.S. EPA authorized representatives are allowed access to any laboratories and personnel utilized by the Respondent for analyses;

2. Ensure that all sampling and analyses are performed according to U.S. EPA methods or other methods deemed satisfactory by the U.S. EPA; and

3. Ensure that any laboratories utilized by the Respondent for analyses participate in a U.S. EPA quality assurance/quality control program equivalent to that which is followed by the U.S. EPA, and which is deemed acceptable to U.S. EPA. As part of such a program, and upon request by the U.S. EPA, such laboratories shall perform analyses of samples provided by the U.S. EPA to demonstrate the quality of analytical data for each such laboratory.

XVII. FORCE MAJEURE

A. The Respondent shall cause all work to be performed within the time limits set forth herein, unless performance is delayed by events which constitute a force majeure. For purposes of this Consent Order, a "force majeure" is an event beyond the control of the Repondent which delays performance of any obligations required by this Consent Order. Any delay caused by action or inaction by federal, state or local regulatory authorities in granting permits which could not have been overcome by the best efforts of the Respondent, shall be considered a force majeure and shall not be deemed a violation

of any obligation required by this Consent Order. Increases of costs shall not be considered circumstances beyond the control of the Respondent.

B. The Respondent shall notify the U.S. EPA in writing no later than five (5) calendar days after any event which the Respondent contends is a force majeure. Such notification shall describe the anticipated length of the delay, the cause or causes of the delay, the measures taken and to be taken by the Respondent to minimize the delay, and the timetable by which these measures will be implemented. The Respondent shall have the burden of demonstrating that the event is a force majeure.

C. If the U.S. EPA agrees that a delay is attributable to a force majeure, the time period for performance under this Consent Order shall be extended for the time period attributable to the event constituting the force majeure.

XVIII. STIPULATED PENALTIES

A. Respondents shall be liable for payment into the Hazardous Substances Response Trust Fund administered by the U.S. EPA of the sums set forth below as stipulated penalties for each week or part thereof that the Respondent fail to submit a report or document or comply with a schedule in accordance with the requirements contained in this Consent Order, unless U.S. EPA

determines that such delay is attributable to a force majeure as defined in Article XVII above. Such sums shall be due and payable within fifteen (15) days of receipt of notification from the U.S. EPA assessing the penalties. These stipulated penalties shall accrue in the amount of 1,000.00 for the first week or part thereof, and $2,000.00 for each week or part therof thereafter for delays in submittal of the Work Plan, draft RI, final RI, draft FS, and final FS.

B. The stipulated penalties set forth in paragraph A of this section shall not preclude the U.S. EPA from electing to pursue any other remedy or sanction because of the Respondent's failure to comply with any of the terms of this Consent Order, including a suit to enforce the terms of this Consent Order. Said stipulated penalties shall not preclude the U.S. EPA from seeking statutory penalties up to the amount authorized by law in the event of Respondent's failure to comply with any requirements of this Consent Order.

XIX. DISPUTE RESOLUTION

A. The parties shall use their best efforts to in good faith resolve all disputes or differences of opinion informally. If, however, disputes arise concerning any provision of or matter pertaining to this Consent Order which the parties are unable to resolve informally, the Respondent shall present a written notice

of such dispute to the U.S. EPA which shall set forth specific points of dispute, the position of the Respondent and the technical basis therefor, and any actions which the Respondent considers necessary.

B. Within ten (10) calendar days of receipt of such a written notice, the U.S. EPA shall provide a written response to the Respondent setting forth its position and the basis therefor. During the five (5) business days following receipt of the response, the U.S. EPA and the Respondent shall attempt to negotiate in good faith a resolution of their differences.

C. Following the expiration of the time periods described in Paragraph B above, if the U.S. EPA concurs with the position of the Respondent, the Respondent shall be so notified in writing and this Consent Order shall be modified to include any necessary extensions of time or variances of work. If the U.S. EPA does not concur with the position of the Respondent, the U.S. EPA shall resolve the dispute, based upon and consistent with the terms of this Consent Order, SARA and the NCP, and shall provide written notification of such resolution to the Respondent. Such decision shall be made after review by the appropriate personnel at the U.S. EPA.

D. The pendency of dispute resolution set forth in this Article shall not affect the time period for completion of work and/or obligations to be performed under this Consent Order, except that, upon mutual agreement of the U.S. EPA and the Respondent, any time period may be extended not to exceed the actual time taken to resolve the dispute. Elements of work and/or obligations not affected by the dispute shall be completed in accordance with the schedule contained in the Consent Order and in the RI/FS Work Plan.

E. Upon resolution of any dispute, whether informally or using the procedures in this Section any additions or modifications required as a result of such dispute resolution shall immediately be incorporated, if necessary, into the appropriate plan or procedure and into this Consent Order. The Respondent shall proceed with all remaining work according to the modified plan or procedure.

XX. COMMUNITY RELATIONS AND PUBLIC COMMENT

A. The Respondent shall cooperate with the U.S. EPA in providing RI/FS information to the public. As requested by the U.S. EPA, the Respondent shall participate in the preparation of all appropriate information disseminated to the public and in

public meetings which may be held or sponsored by the U.S. EPA to explain activities at or concerning the Facility, including the findings of the RI/FS.

XXI. RECORD PRESERVATION

The Respondent agrees to preserve, during the pendency of this Consent Order, and for a minimum of five (5) years after termination of this Consent Order, all records and documents in the possession of the Respondent, or in the possession of any division, employees, agents, accountants, contractors, or attorneys of the Respondent, which relate in any way to the Facility. Upon request by the U.S. EPA, the Repondent shall make available to the U.S. EPA such records, or copies of any such records, subject to Paragraph C of Article XV of this Consent Order.

XXII. SARA FUNDING

A. The Respondent waives any claims or demands for compensation or payment under Sections 111 and 112 of SARA against the United States or the Hazardous Substance Response Trust Fund established by Section 221 of SARA for or arising out of any activity performed or expenses incurred pursuant to this Consent Order.

B. This Consent Order does not constitute any decision on preauthorization of funds under Section 111(a)(2) of SARA.

XXIII. RESERVATION OF RIGHTS

A. The U.S. EPA reserves all rights and defenses that it may have pursuant to any available legal authority. The Respondent reserves all rights and defenses that it may have pursuant to any available legal authority for matters not covered by this Consent Order.

B. Nothing herein shall waive the right of the U.S. EPA to enforce this Consent Order, or to take action pursuant to Sections 104, 106(a) and 107 of SARA. The U.S. EPA reserves the right to take any enforcement action pursuant to SARA and/or any available legal authority, including the right to seek injunctive relief, monetary penalties, and punitive damages. In addition, the U.S. EPA reserves the right to undertake any remedial investigation/feasibility study work, and/or any removal, remedial and/or response actions relating to the Facility, and to seek recovery from the Respondent for any costs incurred in undertaking such actions.

C. Nothing herein is intended to release, discharge, or in any way affect any claims, causes of action or demands in law or equity which the parties may have against any person, firm,

partnership or corporation not a party to this Consent Order for any liability it may have arising out of, or relating in any way to, the generation, storage, treatment, handling, transportation, release or disposal of any materials, hazardous substances, hazardous wastes, contaminants, or pollutants at, to, in the vicinity of or from the Facility. The parties to this Consent Order expressly reserve all rights, claims, demands, and causes of action they have against any and all other persons and entities who are not parties to this Consent Order, and as to each other for matters not covered hereby.

D. The U.S. EPA recognizes that the Respondent may have the right to seek contribution, indemnity and/or any other available remedy against any person found to be reponsible or liable for contributions, indemnity or otherwise for any amounts which have been or will be expended by the Respondent in connection with the implementation of this Consent Order.

E. Nothing herein shall be construed to release the Respondent from any liability for failure of the Respondent to perform the RI/FS in accordance with this Consent Order, including, the RI/FS Statement of Work attached hereto and incorporated herein. The parties further expressly recognize that this Consent Order and the successful completion and approval of the RI/FS do not represent satisfaction, waiver,

release, or covenant not to sue, of any claim of the United States against the Respondent relating to the Facility, (including claims to require Respondent to undertake further response actions and claims to seek reimbursement of response costs pursuant to Section 107 of SARA) except that, upon receipt of written notice of satisfaction as provided in Article XXIX of this Consent Order, Respondent shall have no further obligations under this Consent Order.

F. Nothing herein is intended to be a release or settlement of any claim for personal injury or property damage by any person not a party to this Consent Order.

G. Nothing in this Consent Order is intended by the parties to be an admission of law or fact by the Respondent.

XXV. REIMBURSEMENT OF COSTS

A. Within ninety (90) calendar days of the effective date of this Consent Order, the U.S. EPA shall provide the Respondent with an accounting and supporting documentation of all response costs incurred by the U.S. EPA prior to the effective date of this Consent Order. Within sixty (60) calendar days of receipt of such accounting, the Respondent shall pay to the U.S. EPA the response costs sums attributable to the site incurred prior to the effective date of this Consent Order as specified in the

accounting. The Respondent may invoke dispute resolution hereunder with regard to any sums which it claims are not consistent with SARA and the NCP in which case Respondent shall pay all undisputed amounts within the time period hereunder. Any cost reimbursement payments that the Respondent is required to make as a result of dispute resolution shall be made within thirty (30) calendar days of the resolution of said dispute.

B. At the end of each twelve (12) month period beginning with the effective date of this Consent Order, the U.S. EPA shall, within ninety (90) days, submit an accounting to the Respondent of all oversight costs incurred by the U.S. EPA with respect to this Consent Order during the previous twelve (12) month period including, but not limited to, the costs incurred by the U.S. EPA in having a qualified person oversee the conduct of this RI/FS pursuant to Section 104(a) of SARA. Within sixty (60) calendar days of receipt of such accounting, the Respondents shall remit a check to the U.S. EPA for response costs attributable to the site as specified in the accounting. The Respondent may invoke dispute resolution hereunder with regard to any sums which it claims were not consistent with SARA and the NCP in which case Respondent shall pay all undisputed amounts within the time period hereunder. Any cost reimbursement payment

that Respondent is required to make as a result of dispute resolution shall be made within thirty (30) calendar days of the resolution of said dispute.

C. Payment to the U.S. EPA for response and oversight costs incurred by the U.S. EPA shall be made to the order of the Hazardous Substance Response Trust Fund. Checks payable pursuant to this paragraph should specifically reference the identity of the site and be addressed to:

U.S. EPA
Superfund Accounting
P.O. Box 371003M
Pittsburgh, Pennsylvania 15251
Attn: Superfund Collection Office.

D. Copies of correspondence and checks should be sent at the time of the payments to the U.S. EPA Project Coordinator and to:

U.S. EPA, Region V
Office of Regional Counsel(5CS-TUB-3)
SWER Branch
230 South Dearborn Street
Chicago, Illinois 60604
Attn: Ms. Isalee Coleman

E. The U.S. EPA reserves the right to bring an action against the Respondent for recovery of any future costs incurred by the United States in connection with any response activities conducted or to be conducted at the Facility, other than those response activities completed pursuant to this Consent Order to the satisfaction and approval o the U.S. EPA.

XXVI. INDEMNIFICATION OF THE UNITED STATES

A. The Respondent agrees to indemnify and save and hold the United States Government and its agencies,departments, agents, and employees, harmless from any and all claims or causes of action arising from, or on account of, acts or omissions of the Respondent, its officers, employees, receivers, trustees, agents, or assigns, in carrying out the activities pursuant to this Consent Order, provided that nothing herein shall be construed to waive rights under The Federal Tort Claims Act. The Respondent shall not be responsible for liability arising from the intentional misconduct or negligent acts or omissions of employees or agents of the U.S. EPA.

B. The U.S. EPA is not a party to any contract involving the Respondent at the Facility.

XXVII. EFFECTIVE DATE

This Consent Order shall be made effective five days after it is signed by the Waste Management Division Director of U.S. EPA.

XXVIII. SUBSEQUENT AMENDMENT

In addition to the procedures set forth in Sections XI, XIV, XVII, and XVIII of this Consent Order, this Consent Order may be amended by mutual agreement of the U.S. EPA and the Respondent.

Any amendment of this Consent Order shall be in writing, signed by the parties, and shall have as the effective date that date five days after such amendment is signed by the U.S. EPA.

XXIX. TERMINATION AND SATISFACTION

A. The provisions of this Consent Order shall be deemed satisfied upon receipt by the Respondent of written notice from the U.S. EPA that the Respondent has demonstrated that all of the terms of this Consent Order, including any additional work, modifications or amendments, have been completed in accordance with the terms hereof to the satisfaction of the U.S. EPA. Upon such demonstration by the Respondent, said written notice shall not be unreasonably withheld or delayed.

IT IS SO AGREED:

BY: Robert J Beard 9/28/88
For: Hi-Mill Manufacturing Co. Date

IT IS SO ORDERED AND AGREED:

BY: Basil G. Constantelos 9/30/88
Basil G. Constantelos, Director Date
U.S. EPA, Region V
Waste Management Division

EFFECTIVE DATE: 10/5/88

STATEMENT OF WORK FOR CONDUCTING A REMEDIAL INVESTIGATION AND FEASIBILITY STUDY AT THE HI-MILL MANUFACTURING COMPANY SITE HIGHLAND, MICHIGAN

This document constitutes the Statement of Work (SOW) to conduct a Remedial Investigation and Feasibility Study (RI/FS) at the Hi-Mill Manufacturing Company Site in Highland, Michigan. The purpose of a SOW document is to provide the direction and intent of the RI/FS. An RI/FS Workplan will be developed which will provide more detailed guidance on the execution of the RI/FS.

The purpose of the RI is to determine the nature and extent of contamination at the Highland Manufacturing Company site. The purpose of the FS is to develop and evaluate appropriate remedial action alternatives based on the RI data and report. All personnel, materials, and services required to perform the RI/FS will be provided by the contractor.

This SOW generally addresses items needed to fulfill the requirements for an RI/FS. The RI/FS Work Plan to be developed pursuant to the SOW will present a phased approach that recognizes the interdependence of the RI and FS. The data collected in the RI influence the development of remedial alternatives in the FS, which in turn affects the data needs and scope of treatability studies and additional field investigations. U.S. EPA's March 1988 "Draft Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" should be utilized in the preparation of the Work Plan and the execution of the RI/FS.

In the following sections, brief discussions of the major RI/FS tasks are presented, by three major topical categories:

* Plans and Management;
* Remedial Investigation (RI); and
* Feasibility Study (FS).

PLANS AND MANAGEMENT

TASK 0 - WORK PLAN PREPARATION

An RI/FS Work Plan (WP) will be prepared for the Hi-Mill Manufacturing Company site that details the technical approach, personnel requirements, and schedule for each task described in this SOW. The schedule will show the implementation of tasks and submission of deliverables in weeks subsequent to approval and acceptance of prior deliverables. Incorporated into the WP will be several specific plans addressing sampling, quality assurance / quality control (QA/QC), health and safety. These specific plans are as follow:

Sampling Plan

A Sampling Plan (SP) that addresses all data acquisition activities will be prepared. The plan will contain a statement of sampling objectives, specification of equipment, required analyses, sample types, sample locations, and frequency. The plan will address specific hydrologic, hydrogeologic, and air transport characterization methods including, but not limited to, geologic mapping, geophysics, field screening, drilling and well installation, ground water flow determination, and sampling. The application of these methods will be described for each major subtask within the site investigation (e.g., waste characterization, migration pathway assessment, and contaminant characterization). The plan will also identify the data requirements of specific remedial technologies which may be necessary to evaluate remedial alternatives in the FS. The Compendium of Superfund Field Operations Method (EPA/540/P-87/001a, OSWER Directive 9355.0-14, Sept. 1987) will be utilized in the selection and definition of field methods, sampling procedures, and custody.

Quality Assurance Project Plan

A QAPP, prepared in accordance with current U.S. EPA guidance, will be appended to the SP. The purpose of the QAPP is to ensure that formal procedures are available for all activities affecting the quality of data collected.

The QAPP will be prepared according to U.S. EPA guidance documents, and will include the following 16 elements:

1. Title page with provisions for approval signatures;
2. Table of contents;
3. Project description;
4. Project organization and responsibility;
5. QA objectives for measurement data in terms of precision, accuracy, completeness, representativeness and comparability (for each parameter);
6. Sampling procedures;
7. Chain of custody procedures;
8. Calibration procedures and frequency;
9. Analytical procedures;
10. Data reduction, validation and reporting;
11. Internal quality control checks;
12. Performance and system audits and frequency;
13. Preventive maintenance procedures and schedules;
14. Specific routine procedures to be used to assess data precision, accuracy, and completeness of specific measurement parameters involved;
15. Corrective action;
16. Quality assurance reports to management.

Health and Safety Plan

A Health and Safety Plan (HSP) will be prepared to address hazards that investigation activities may present to the investigation team and to the surrounding community. The HSP will conform to applicable regulatory requirements and guidance, including the U.S. EPA Standard Operating Safety Guides, and will detail personnel responsibilities, protective equipment, procedures and protocols, decontamination, and training and medical surveillance as required under 29 CFR 1910.120. The plan will identify problems or hazards that may be encountered and their solutions. Procedures for protecting third parties, such as visitors or the surrounding community, will also be provided.

Endangerment Assessment Plan

An Endangerment Assessment Plan will be developed for identifying the baseline risks posed by the Site under the no action alternative. The methodology presented in this plan will conform to the Superfund Public Health Evaluation Manual (updated 10/87) and the Superfund Exposure Assessment Manual (9/87).

Data Management Plan

A Data Management Plan will be developed to document and track investigation data and results. The plan will identify and establish laboratory and data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents.

ATSDR Health Assessment

The WP for the site shall also provide for collection of adequate information to support an ATSDR Health Assessment which is required by SARA. Since the health assessment will be prepared by ATSDR, all draft Work Plans and support documents will be submitted for ATSDR review and comment (by the U.S. EPA RPM) to ensure that their needs and requirements are being met. In the event that the health assessment has already been completed by the ATSDR,the report will include and address the findings of that report.

The preparation of the project plans will be preceded by an evaluation of the existing information and initiation of investigative support activities (Task 1).

Specifically, the RI/FS WP will be developed and implemented in conformance with all provisions of this SOW, and the standards set forth in the following statutes, regulations, and guidance:

* Section 121 of CERCLA as amended by SARA;

* U.S. EPA March 1988 Guidance on Conducing Remedial Investigations and Feasibility Studies under CERCLA;

* National Contingency Plan, dated November 1985, as amended;

* Additional guidance documents provided by the U.S. EPA.

REMEDIAL INVESTIGATION

Objectives and Scope

The objectives of the RI are to:

* Characterize the source(s) of potential contamination;

* Characterize the hydrogeologic and physical setting to determine the most likely contaminant migration pathways and physical features that could effect potential remedial actions;

* Determine the migration rates, extent, and characteristics of contamination that may be present at the site;

* Gather data and information to the extent necessary and sufficient to quantify risk to public health and the environment and to support the development and evaluation of viable remedial alternatives in the FS.

The remedial investigation consists of five tasks:

Task 1: Description of Current Situation and Investigative Support
Task 2: Site Investigation
Task 3: Site Investigation Analysis
Task 4: Bench/Pilot Testing Studies
Task 5: Reports

A description of each of these tasks is presented in the following section.

TASK 1 - INVESTIGATIVE SUPPORT AND DESCRIPTION OF CURRENT SITUATION

Site Mapping

An accurate topographic map of appropriate working scale and contour interval will be prepared. A base map of the site will be prepared from this topographic map, and will have a scale of one inch to 100 feet (1":100') and two foot contour intervals. The base map will illustrate the locations of wetlands, floodplains, water features, drainage patterns, tanks, buildings utilities, paved areas, easements, right-of-ways, and other pertinent features. Larger scale maps will be produced form the base mapping, as necessary.

Surveying will be required to establish horizontal and vertical controls for the site relative to the National Geodetic Vertical Datum of 1929. In addition to the topographic map, a grid plan will be prepared using the base map and grid overlay at a nominal scale of the map. This grid plan will show the location of existing monitoring wells, additional wells installed, all sampling locations, and water supply wells.

A legal description of the property will be reviewed and field checked. The intent is not to perform a boundary survey, but to locate the boundaries so that future activities do not carry over onto adjacent properties without proper permission.

Meets and Bounds

A legal description of the site will be assembled from existing county and township records and the results of the site survey.

Access Arrangements

U.S. EPA will obtain an executed access agreement to enter the site. Further arrangements may include negotiating access agreements for construction of access roads or other activities related to the RI/FS.

Preparation of Support Facilities

Arrangements will be made to construct the appropriate support facilities and/or procure the equipment necessary to perform a hazardous site investigation. This includes preparation of decontamination facilities, utility hook-ups, and site access control stations.

Description of Current Situation

The background information pertinent to the site and to environmental concerns will be described, and the purpose of the RI will be further detailed. The data gathered during previous investigations will be reviewed and evaluated. Regional information will be obtained from available USGS and Michigan Geological Survey reports. The existing site information that will be reviewed may include but will not necessarily be limited to:

* MDNR and U.S. EPA files;
* Highland County Soils Conservation Service reports;
* Aerial photographs;
* Historical water quality data;
* U.S. and Michigan Geological Survey files;
* Disposal records (if available).

In addition to this literature search, on-site activities may be used to confirm and/or update certain information. For example, existing monitor wells may be inspected to determine if they are functional. Also, the location and status of selected water supply wells may be field verified.

Information and data that are gathered during these initial steps will be used to generate a preliminary Site Evaluation Report which will address the following:

Site Background

A summary of pertinent boundary conditions, general site physiography, hydrology, and geology will be prepared. A complete site history as it pertains to waste disposal activities and ownership transfer will also be prepared.

Nature and Extent of the Problem

A summary of actual and/or potential on-site and off-site health and environmental effects will be prepared. Threats or potential threats to public health and the environment will be emphasized.

History of Response Actions

A history of response actions conducted by local, state, or private parties will be prepared.

Definition of Boundary Conditions

Site boundary conditions will be established to limit the area of investigation. The boundaries will be set so that the on-site activities will cover the contaminated media in sufficient detail to support the FS. Boundaries for site access control and site boundary security will also be identified. The boundaries of the study area may or may not correspond to the property boundaries.

Identification of Potential Receptors

Potential receptors, human and environmental, will be identified and used in the development of the site conceptual model, migration pathway assessment, and endangerment assessment. Included will be the identification of private and public water supply wells within a 2-mile radius of the site. If possible, well construction details for these wells and other private water supply wells, which may have been previously sampled will be obtained. A table summarizing the known construction details will be prepared and submitted with the original drilling logs, as available.

Develop Site Conceptual Model

Information on the waste sources, pathways, and receptors at the site will be used to develop a conceptual site model to evaluate potential risks to human health and the environment. The conceptual site model will include all known and suspected sources of contamination, types of contaminants and affected media, known and potential routes of migration, and all known or

potential human and environmental receptors. If exact data are unavailable be identified so that the model identifies the possible range of contaminant migration and the potential effects on receptors. This effort, in addition to assisting in identifying where samples need to be taken, will also assist in identifying appropriate remedial technologies.

The Investigative Support and Description of Current Situation (Task 1) will be conducted prior to, or concurrent with, the Work Plan Preparation (Task 0). The Preliminary Site Evaluation Report, consisting of activities completed in Task 1, will be submitted as supporting documentation with the Work Plan.

TASK 2 - SITE INVESTIGATION

Investigations necessary to characterize the site and its actual or potential hazard to public health and the environment will be conducted. The investigations will result in data of adequate technical content to support the development and evaluation of remedial alternatives during the FS. Investigation activities will focus on problem definition and data to support the screening of remedial technologies, alternative development and screening, and detailed evaluation of alternatives.

The site investigation activities will follow the Plans set forth in Task 0. Sample analyses will be conducted at laboratories following EPA protocols or their equivalents. Strict chain-of-custody procedures will be followed, and all samples will be located on the site map (and grid system) established under Tasks 0 and 1. A description of the types of investigations that will be conducted is presented below.

Source Characterization

An investigation will be carried out to characterize the physical and chemical aspects of the waste materials and the materials in which they are contained. The investigation of these source areas will involve obtaining data related to:

* Waste characteristics (type, quantity, chemical and physical properties, and concentrations); and

* Facility characteristics (type and integrity of containment, leachate collection systems, and drainage control).

It is anticipated that this information will be obtained from a combination of existing site information, field inspections, and site sampling activities.

The source characterization will culminate in the preparation and submittal of a technical memorandum. This memorandum will summarize the findings of the source characterization and will recommend parameters, or classes of parameters, which will be the focus of subsequent contaminant characterization studies.

Migration Pathway Assessment

The migration pathways at the Peerless Plating Company site will be characterized through the following types of investigations:

Hydrogeologic

A hydrogeologic study will be performed to further evaluate the subsurface geology and characteristics of the water bearing formations. This study will define the site hydrostratigraphy, controlling geologic features, zones of preferential ground water transmission, and the distribution of hydraulic heads within the water bearing formations. The results of this study will be combined with the existing site data described in the preliminary site evaluation report and the results of the source characterization to define the ground water flow patterns and to examine the vertical and lateral extent of contaminant migration. These data will form the rationale for locating and designing monitoring wells and the subsequent contaminant characterization.

Hydrologic

Drainage patterns and runoff characteristics will be evaluated for the potential of erosional transport. Surface water features such as streams, ponds, and lakes will also be evaluated. Staff gauges may also be used to evaluate the potential of hydraulic connection between surface water bodies and the ground water flow system, and to determine the potential for sediment transport.

Soils and Sediment

The physical characteristics of the site soils and aquatic sediments will be evaluated. Some elements of this investigation may overlap with the above described investigations.

Air

The potential for airborne particle and vapor transport will be evaluated to determine if an atmospheric testing program (over and above that required for assuring the personal protection of the site workers and surrounding community) should be initiated at later project stages. Meteorological data may be required to characterize the atmospheric transport.

Human Populations

Information will be collected to identify, enumerate, and characterize human populations potentially exposed to contaminants released from the site. For a potentially exposed population, information will be collected on population size and location. Special consideration should be given to

identifying potentially sensitive subpopulations such as children, pregnant women, infants, and the chronically ill. The identification of these high-risk subpopulations should be linked with the potential contaminants of concern (i.e., those that are mutagenic, teratogenic, etc.) to identify how these populations may be at risk. Census and other survey data may be used to identify and describe the population exposed to various contaminated media. Information may also be available from USGS maps, land use plans, zoning maps, and regional planning authorities.

Ecological Investigations

Biological and ecological information will be collected for use in the risk assessment,if necessary. It will aid in the evaluation of impacts to the environment associated with this site and also help to identify potential effects with regard to the implementation of remedial actions. The information will include a general identification of flora and fauna in and around the site (including endangered and threatened species and those consumed by humans or found in human food chains) and identification of critical habitats. Bioassay information may be needed for species that are known to be consumed by humans. Chapter 12 of A Compendium of Superfund Field Operations Methods and Table 1 provide a summary of both environmental information that may be needed and potential collection methods. The Natural Resources Trustee for the site will be contacted (by U.S. EPA RPM) to determine if other ecological data are available that may be relevant to the investigation.

It is anticipated that this information will be derived form a combination of existing data information, and data resulting from the field investigations.

Contaminant Characterization

Data generated from the Pathway Assessments and Source Characterization will be used to design an environmental sampling and analysis program. The objective of this program is to evaluate the extent and magnitude of contaminant migration along the pathways of concern in the five media of ground water, surface water soil, sediments, and air at the Hi-Mill Manufacturing Company site.

Monitoring points will be installed in each appropriate media previously identified as a migration pathway. This monitoring network may incorporate several of the piezometers and/or staff gauges installed during the Pathway Assessment.

The analytical parameters list used in this subtask will be based on the data collected during the source characterization and review of background information. The selection of parameters or classes of parameters (i.e., volatile organics, metals, etc.) will be based upon their source concentration and their persistence and mobility within the most likely pathway of migration. Provisions will be made for conducting full U.S. EPA Contract Lab Program Target Compound List (TCL) analyses at those monitoring stations where there is a reasonable anticipation of detecting a

complex contaminant profile. Samples will be collected, handled, and analyzed in accordance with the protocols and procedures described in the site SP and QAPP. An addendum to the SP and QAPP may be required for this additional sample collection and analyses.

Provisions will be made for conducting additional site investigation activities after completion of Task 7: Screening of Alternatives. Task 8 outlines these supplemental investigations which are intended to further characterize the sources, pathways, and/or contaminants and to satisfy the specific data requirements of the applicable remedial actions. The Plans for these investigations and the bench/pilot studies will be prepared and submitted for U.S. EPA comment and approval.

TASK 3 - SITE INVESTIGATION ANALYSES

An analysis of data collected during this investigation will be made to assure that the quality (e.g., QA/QC procedures have been followed) and quantity of data adequately support the Endangerment Assessment and FS.

Endangerment Assessment

A Contaminant Pathway and Transport Evaluation and Endangerment Assessment will be prepared describing the specific chemicals at the Hi-Mill Manufacturing Company site and ambient levels at the site; the number and location and types of nearby populations; activities and pathways that may result in an actual or potential threat to public health, welfare, or the environment; and a projection of chemical concentrations at the different points of exposure through each media pathway over the likely period of exposure.

This assessment will be conducted in accordance with the procedures described in the Superfund Public Health Evaluation Manual, (updated 10/87), and the Superfund Exposure Assessment Manual, (9/87).

TASK 4- BENCH/PILOT TESTING STUDIES

If necessary, bench and pilot scale testing studies will be performed to determine the applicability of selected remedial technologies to site specific conditions. These may include treatability and cover studies, aquifer testing, and/or material compatibility testing. These studies will be conducted in the later stages of the RI after the initial screening of the remedial technologies (Task 7). If required, supplements to the appropriate plans (i.e., SP, QAPP) will be prepared and submitted to the U.S. EPA for review and approval prior to initiation of this task.

TASK 5 - REPORTS

Progress Reports

Monthly progress reports will be prepared to describe the technical progress of the RI/FS. These reports shall be submitted to the U.S. EPA. The monthly progress reports shall include the following information:

* Progress made this reporting period;
* Problems resolved;
* Anticipated problems and recommended solution;
* Deliverables submitted;
* Upcoming events / activities planned;
* Key personnel changes;
* Subcontracting;
* Travel;
* Percent Complete;
* Schedule;
* Budget.

Technical Memoranda

The results of specific remedial investigation activities will be submitted to the U.S. EPA and MDNR throughout the RI/FS process. These memoranda will be submitted in draft form and revised upon receipt of U.S. EPA comments. The specific technical memoranda include:

* A Site Evaluation Report;

* A Source Technical Memorandum;

* A Techncial Memorandum convering the Site Investigations and Analyses;

* A Hydrogeologic Assessment to discuss groundwater flow and contamination;

* An Endangerment Assessment.

Remedial Investigation Report

A final report covering the investigations will be completed once approval of the Technical Memoranda has been given by U.S. EPA. The suggested format for the RI Report is given in Table 2. The report will characterize the site and summarize data collected and conclusions drawn from the preceding tasks. The report will be submitted in draft form for review and comment. Technical memorandums prepared previously will be summarized and referenced in order to limit the size of the report. However, the report will completely document the RI. Upon receipt of comments, a draft final report will be prepared and submitted. The RI report will not be considered final until a letter of approval is issued by the U.S. EPA Remedial Project Manager. A meeting may be scheduled by the U.S. EPA RPM to discuss EPA and MDNR comments on the draft RI report.

FEASIBILITY STUDY

Scope

The purpose of the FS for the Hi-Mill Manufacturing Company site is to develop and evaluate remedial alternatives that protect human health and the environment, and present the relevant information needed to allow for the selection of a site remedy which will be protective of human health and the environment.

The FS will conform to Section 121 of CERCLA as amended by SARA; the NCP, as amended; and the FS Guidance, as amended. The FS is comprised of the following tasks:

Task 6: Development of Remedial Action Alternatives
Task 7: Screening of Alternatives
Task 8: Treatability and Supplemental Remedial Investigations
Task 9: Detailed Analysis of Alternatives
Task 10: Feasibility Study Report

The intent and purpose of each of these tasks is outlined in the following sections. The technical approach and schedule for each of these tasks will be detailed in the RI/FS Work Plan.

TASK 6 - DEVELOPMENT OF REMEDIAL ALTERNATIVES

This task may be viewed as consisting of steps that involve making successively more specific definitions of potential remedial activities. These steps are described as follow:

Subtask 6A: Develop Remedial Action Objectives

Site-specific objectives for remedial action will be established for the Hi-Mill Manufacturing Company site considering the description of the current situation, information gathered during the RI, Section 300.68 of the NCP, U.S. EPA interim guidance, and the requirements of other applicable U.S. EPA, Federal, and Michigan environmental standards, guidance, and advisories.

These objectives consist of medium-specific or operable unit-specific goals for protecting human health and the environment. They will specify: the contaminant(s) of concern; exposure route(s) and receptor(s); and an acceptable contaminant level or range of levels for each exposure route.

Acceptable exposure levels for human health will be determined on the basis of risk factors and contaminant-specific ARARS. Contaminant levels in each media will be compared with these acceptable levels, which will be determined on the basis of an evaluation of the following factors:

*For carcinogens, whether the chemical-specific ARARS provides protection within the risk range of 10 -4 to 10 -7 and whether achievement of each chemical-specific ARAR will sufficiently reduce the total risk from exposure to multiple chemicals.

*For non-carcinogens, whether the chemical-specific ARAR is sufficiently protective if multiple chemicals are present at the site.

*Whether environmental effects (in addition to human health effects) are adequately addressed by the ARARS.

*Whether the ARARS adequately address all significant pathways of human exposure identified in the baseline risk assessment. For example, if exposure from the ingestion of fish and drinking water are both significant pathways of exposure, application of an ARAR that is based only on drinking water ingestion (e.g., MCLs) may not be adequately protective.

If an ARAR is determined to be protective, it will be used to establish the acceptable exposure level. If not (presents a risk greater than 10 -4), or doesn't exist for the specific chemical or pathway of concern, or multiple contaminants may be posing a cumulative risk, acceptable exposure levels will be identified through the risk assessment process. Reference to the SPHEM for additional details.

Subtask 6B - Develop General Response Actions

General response actions describing those actions that will satisfy the remedial action objectives will be developed. These may include treatment, excavation, containment, extraction, disposal, institutional actions, or a combination of these.

Subtask 6C - Identify Volumes or Areas of Media

In this subtask, an initial determination is made of areas or volumes of media to which general response actions might be applied. This will be done for each medium of interest at the Hi-Mill Manufacturing Company site.

Subtask 6D - Identify and Screen Remedial Technologies and Process Options

In this subtask, the universe of potentially applicable technology types and process options is reduced by evaluating the options with respect to technical implementability. "Technology types" refer to general categories of technologies, such as chemical treatment, thermal destruction, solidification, capping or dewatering. "Technology process options" refer to specific processes within each technology type. Several broad technology types may be identified for each general response action, and numerous technology process options may exist in each technology type. This screening is accomplished by using readily available information from the RI to screen out technologies and process options that cannot be effectively implemented.

Subtask 6E - Evaluate Process Options

In this subtask, the technology processes considered to be implementable are evaluated in greater detail before selecting one or two processes to represent each technology type. One, or in some cases, two, representative processes are selected, if possible, for each technology type to simplify the subsequent development and evaluation of alternatives without limiting flexibility during remedial design. Process options are evaluated using effectiveness, implementability, and cost criteria. These criteria are applied only to technologies and the general response actions they are intended to satisfy - not to the site as a whole. Also, the evaluation will typically focus on the effectiveness factor. The evaluation of process options is illustrated in Figure 1.

Subtask 6F - Assemble Alternatives

Alternatives are assembled using a combination of general response actions and the process options chosen to represent the various technology types for each media or operable unit, for the site as a whole. Figure 3 illustrates how general response actions may be combined to form a range of sitewide alternatives. Alternatives to be developed will include at least the following:

a. Treatment alternatives for source control that eliminate or minimize need for long-term management (including monitoring).

b. Alternatives involving treatment as a principal element to reduce the toxicity, mobility or volume of waste.

c. An alternative that involves containment of waste with little or no treatment but provides protection of human health and the environment primarily by preventing exposure or reducing the mobility of the waste.

d. A no action alternative.

Alternatives Array Document

To obtain ARARS from the MDNR, a detailed description of alternatives (including the extent of remediation, contaminant levels to be addressed, and method of treatment) will be prepared. This document will also include a brief site history and background, a site characterization that indicates the contaminants of concern, migration pathways, receptors, and other pertinent site information. A copy of this Alternative Array Document will be submitted to the U.S. EPA along with the request for a notification of the standards. If needed, a meeting will be scheduled between the U.S. EPA and MDNR to discuss the Alternatives Array document and ARARS.

in other respects. The consideration of reliability will include the potential for failure and the need to replace the remedy.

***Implementability:** Alternatives will be evaluated as to the technical feasibility and availability of the technologies that each alternative would employ; the technical and institutional ability to monitor, maintain, and replace technologies over time; and the administrative feasibility of implementing the alternative.

***Cost:** The cost of construction and long-term costs to operate and maintain the alternative will be evaluated. This evaluation will be based on conceptual costing information and not a detailed cost analysis. At this stage of the FS, cost will be used as a factor when comparing alternatives that provide similar results, but will not be a consideration at the screening stage when comparing treatment and non-treatment alternatives.

Subtask 7C - Alternative Screening

In this subtask, alternatives with the most favorable composite evaluation of all factors are retained for further consideration during detailed analysis. Alternatives selected will preserve the range of treatment and containment technologies initially developed plus the no action alternative.

A technical memorandum will be prepared and submitted to the U.S. EPA detailing the development and initial screening of remedial alternatives (Tasks #6 and #7). A meeting will also be scheduled between the U.S. EPA and the MDNR to discuss (1) the set of alternatives selected for detailed analysis, and (2) the need for treatability and supplemental remedial investigations and what form they would take.

TASK 8 - TREATABILITY AND SUPPLEMENTAL REMEDIAL INVESTIGATIONS

Data requirements not already available through the Remedial Investigation that are specific to the remedial alternatives identified for detailed analysis in Task 9 will be identified. These additional data needs may involve the collection of site characterization data, supplemental remedial investigations, or treatability studies to better evaluate technology performance.

Subtask 8A - Determination of Data Requirements

Additional data needs can be identified by conducting a more exhaustive literature survey than was originally conducted when potential technologies were initially being identified. The objectives of a literature survey are as follow:

*Determine whether the performance of those technologies under consideration have been sufficiently documented on similar wastes considering the scale and the number of times the technologies have been used.

*Gather information on relative costs, applicability, removal efficiencies, O&M requirements, and implementability of the candidate technologies.

*Determine testing requirements for bench or pilot studies, if required.

Subtask 8B - Treatability Testing

Treatability testing performed during an RI/FS is used to adequately evaluate a specific technology, including evaluating performance, determining process sizing, and estimating costs in sufficient detail to support the remedy-selection process. It is not meant to be used solely to develop detailed design or operating parameters that are more appropriately developed during the remedial design phase. Bench-scale or pilot-scale techniques may be utilized, but in general, treatability studies will include the following steps:

* preparing a work plan (or modifying the existing work plan) for the bench or pilot studies;

* performing field sampling, and/or bench testing, and/or pilot testing;

* evaluating data from field studies, and/or bench testing, and/or pilot testing;

* preparing a brief report documenting the results of the testing.

Chapter 6 of U.S. EPA's draft Guidance for Conducting RI/FSs Under CERCLA (March 1988) provides information regarding this Task.
A technical memorandum will be prepared and submitted to the U.S. EPA detailing Task 8.

TASK 9 - REMEDIAL ALTERNATIVES EVALUATION

Section 121 (b)(1)(A-G) of CERCLA outlines general rules for clean-up actions, and establishes the SARA statutory preference for permanent remedies, and for treatment and/or resource recovery technologies that reduce toxicity, mobility or volume of hazardous substances, pollutants and contaminants. Further, it directs that the long-term effectiveness of alternatives be specifically addressed and that at a minimum the following be considered in assessing alternatives:

A. Long-term uncertainties associated with land disposal;

B. Goals, objectives and requirements of the Solid Waste Disposal Act;

C. Persistence, toxicity, mobility and propensity to bioaccumulate of hazardous substances and their constituents;

D. Short and long-term potential for adverse health effects from human exposure;

Each factor is discussed below:

***Short-term effectiveness:** The assessment against this criterion examines the effectiveness of alternatives in protecting human health and the environment during the construction and implementation period until response objectives have been met.

***Long-term effectiveness and permanence:** The assessment of alternatives against this criterion evaluates the long-term effectiveness of alternatives in protecting human health and the environment after response objectives have been met.

***Reduction of toxicity, mobility and volume:** The assessment against this criterion evaluates the anticipated performance of the specific treatment technologies.

***Implementability:** This assessment evaluates the technical and administrative feasibility of alternatives and the availability of required resources.

***Cost:** This assessment evaluates the capital and O&M costs of each alternative.

***Compliance with ARARS:** This assessment against this criterion describes how the alternative complies with ARARS, or if a waiver is required, how it is justified.

***Overall protection of human health and the environment:** The assessment against this criterion describes how the alternative as a whole achieves and will continue to protect human health and the environment.

***State acceptance:** This assessment reflects the state's (or supporting agency's) apparent preference or concerns about alternatives.

***Community acceptance:** This assessment reflects the community's apparent preferences or concerns about alternatives.

Subtask 9C - Comparison of Alternatives

After each alternative has been individually assessed against each of the nine criteria, a comparative analysis will be conducted. The purpose of this analysis is to compare the relative performance of each alternative with respect to each specific evaluation criterion. The narrative discussion will describe the strengths and weaknesses of the alternatives relative to one another with respect to each criterion, and how reasonable variations of key uncertainties could change the expectations of their relative performance. If innovative technologies are being considered, their potential advantages in cost or performance and the degree of uncertainty in their expected performance (as compared with more demonstrated technologies) will also be discussed. A summary table should be prepared highlighting the assessment of each alternative with respect to

TASK 10 - FEASIBILITY STUDY REPORT

Technical Memoranda

The results of specific feasibility study activities will be submitted to the U.S. EPA throughout the RI/FS process. These memoranda will be submitted in draft form for review and comment. Upon receipt of comments, a final form of these memoranda will be prepared and submitted. The specific technical memoranda and their associated schedule will be identified in the Work Plan, and will include:

* Development and initial screening of remedial alternatives;

* Alternatives Array Document.

Feasibility Study Report

A Feasibility Study report covering the activities performed and conclusions drawn from Tasks 4, 6, 7, 8, and 9 will be completed following the approval of the technical memoranda. A draft report will be submitted to U.S. EPA for review and comment. A meeting will be scheduled to discuss U.S. EPA and MDNR comments, if any, prior to preparation of the final draft report. The FS report will not be considered "draft final" until a letter of approval is issued by the U.S. EPA RPM. The approved draft final FS report will be placed by the U.S. EPA in public repositories for public review and comment as per the Community Relations Plan for this site. Technical memoranda prepared previously will be summarized and referenced in order to limit the size of the report. However, the report will completely document the FS and the process by which the recommended remedial alternative was selected.

Following the public comment period, should it be determined (by U.S. EPA) that, based on the public's comments, the RI/FS requires revision, a revision will be prepared and resubmitted to the U.S. EPA and MDNR or, the U.S. EPA may prepare the revision itself.

The suggested format for the Feasibility Study Report is given in Table 4.

Table 1

SUMMARY OF IMPORTANT ECOLOGICAL INFORMATION

Information Needed	Purpose or Rationale	Appropriate Collection Methods	
		Primary	Secondary
Fauna and Flora	Determine potentially affected ecosystems; determine presence of endangered species	Records of area plants and animals survey, survey of plants and animals on or near site; survey of site or area photographs	Ground surveys and sample collection
Critical Habitats	Determine area on or near site to be protected during remediation	Records of site environment	Ground survey
Land Use Characteristics	Determine if terrestrial environment could result in human exposure, e.g., presence of game animals, agricultural land	Agricultural and development maps; site survey	Ground and aerial survey
Water Use Characteristics	Determine if aquatic environment could result in human exposure, e.g., presence of game, fish, recreational water	Water resource agency reports; site surveys	
Biocontamination	Determine observable impact of contaminants on ecosystems	Records of site environment	Sampling and analysis

Table 2
SUGGESTED RI REPORT FORMAT

Executive Summary

1. Introduction
   - 1.1 Purpose of Report
   - 1.2 Site Background
     - 1.2.1 Site Description
     - 1.2.2 Site History
     - 1.2.3 Previous Investigations
   - 1.3 Report Organization

2. Study Area Investigation
   - 2.1 Includes field activities associated with site characterization. These may include physical and chemical monitoring of some, but not necessarily all, of the following:
     - 2.1.1 Surface Features (topographic mapping, etc.) (natural and manmade features)
     - 2.1.2 Contaminant Source Investigations
     - 2.1.3 Meteorological Investigations
     - 2.1.4 Surface-Water and Sediment Investigations
     - 2.1.5 Geological Investigations
     - 2.1.6 Soil and Vadose Zone Investigations
     - 2.1.7 Ground-Water Investigations
     - 2.1.8 Human Population Surveys
     - 2.1.9 Ecological Investigations
   - 2.2 If technical memoranda documenting field activities were prepared, they may be included in an appendix and summarized in this report chapter.

3. Physical Characteristics of the Study Area
   - 3.1 Includes results of field activities to determine physical characteristics. These may include some, but not necessarily all, of the following:
     - 3.1.1 Surface Features
     - 3.1.2 Meteorology
     - 3.1.3 Surface-Water Hydrology
     - 3.1.4 Geology
     - 3.1.5 Soils
     - 3.1.6 Hydrogeology
     - 3.1.7 Demography and Land Use
     - 3.1.8 Ecology

Table 2 (continued)

4. Nature and Extent of Contamination
   - 4.1 Presents the results of site characterization, both natural chemical components and contaminants in some, but not necessarily all, of the following media:
     - 4.1.1 Sources (lagoons, sludges, tanks, etc.)
     - 4.1.2 Soils and Vadose Zone
     - 4.1.3 Ground Water
     - 4.1.4 Surface Water and Sediments
     - 4.1.5 Air

5. Contaminant Fate and Transport
   - 5.1 Potential Routes of Migration (i.e., air, ground water, etc.)
   - 5.2 Contaminant Persistence
     - 5.2.1 If they are applicable (i.e., for organic contaminants), describe estimated persistence in the study area environment and physical, chemical, and/or biological factors of importance for the media of interest.
   - 5.3 Contaminant Migration
     - 5.3.1 Discuss factors affecting contaminant migration for the media of importance (e.g., sorption onto soils, solubility in water, movement of ground water, etc.)
     - 5.3.2 Discuss modeling methods and results, if applicable.

6. Baseline Risk Assessment
   - 6.1 Public Health Evaluation
     - 6.1.1 Exposure Assessment
     - 6.1.2 Toxicity Assessment
     - 6.1.3 Risk Characterization
   - 6.2 Environmental Assessment

7. Summary and Conclusions
   - 7.1 Summary
     - 7.1.1 Nature and Extent of Contamination
     - 7.1.2 Fate and Transport
     - 7.1.3 Risk Assessment
   - 7.2 Conclusions
     - 7.2.1 Data Limitations and Recommendations for Future Work
     - 7.2.2 Recommended Remedial Action Objectives

Appendixes

A. Technical Memoranda on Field Activities (if available)
B. Analytical Data and QA/QC Evaluation Results
C. Risk Assessment Methods

Table 3
SUGGESTED FORMAT FOR SUMMARIZING ALTERNATIVES ANALYSIS

Assessment Factors	Alternative 1--No Action	Alternative 2--Containment Capping	Alternative 3--Containment, Onsite RCRA Landfill	Alternative 4--In-Situ Treatment, Vapor Extraction	Alternative 5--Treatment, Incineration Onsite
	Fence entire site, deed restrictions to prevent onsite development/use; onsite and offsite use of contaminated ground water; ongoing monitoring.	Demolish and shred buildings; place multimedia cap over entire site; fence, deed restrictions; alternate water supply; ongoing monitoring.	Demolish and shred buildings; excavate soil to $1x10^{-6}$ cancer risk; dispose onsite in a RCRA landfill; fence, deed restrictions; collect ground water and treat by air stripping; ongoing monitoring.	Demolish buildings, place rubble onsite; install soil-vapor extraction system and multimedia cap; fence, deed restrictions; collect/treat ground water as in Alternative 3; ongoing monitoring.	Demolish buildings and shred; excavate soil above $1x10^{-4}$ cancer risk; incinerate soil and rubble and dispose of residuals onsite and cap; collect/treat ground water as in Alternative 3.
Short-Term Effectiveness					
- Time until protection is achieved (after ROD signing)	Reduction of potential for direct contact could be achieved in 3 weeks or less; risk from ground-water ingestion remains.	Cap construction could take 2 years, allowing time for design, bidding, construction, and downtime during winter.	RCRA landfill could take 2.5 years for design and construction, allowing time for staging of excavated soils and downtime during winter.	Soil vapor extraction system would take 10 months for pilot testing, design, and construction. The system would be operated for 5 to 8 years after which a multimedia cap, requiring about 18 months to construct, would be placed over the site.	12 to 16 months for trial burn, design, and construction of incinerator; 6.5 years to incinerate 95,500 yd^3 of soil and demolition debris.
		Six months for water connection.	Ground-water collection and treatment system would take up to 12 months for pilot testing, design, and construction. Pumping time of 20 to 30 years would be required to reach the $1x10^{-6}$ cancer risk level in ground water.	Ground-water component as described in Alternative 3.	Ground-water component as described in Alternative 3.
- Protection of community during remedial actions	Slight increase in dust during fence construction.	Increase in dust during cap construction; contaminated soils remain largely undisturbed.	Significant increase in dust from contaminated soils during excavation and staging.	Slight increase in dust during construction of fence and soil vapor extraction system.	Significant increase in dust during excavation and staging.
			Air impacts from stripping tower largely mitigated by emissions control system.	Air impacts from vapor extraction and stripping towers mitigated by emissions control systems.	Air impacts from incinerator mitigated by emissions control system; air impacts from stripping tower mitigated by emissions control system.
- Protection of workers during remedial actions	Protection required against dermal contact and inhalation during fence construction.	Protection required against dermal contact and inhalation of contaminated dust during cap construction.	Protection required against dermal contact and inhalation of contaminated dust during landfill construction. Also, protection needed against dust and vapors during construction and operation of air stripping system.	Protection required against dermal contact, inhalation of dust or vapors during installation, and operation of soil vapor extraction and air stripping systems.	Protection required against dermal contact, inhalation of soils and dust during excavation and staging; protection also required against dust and vapors during startup and operation of incineration and air stripping systems.
- Environmental impacts	No significant adverse environmental impacts from construction	No significant adverse environmental impacts from construction.	Aquifer drawdown during ground-water extraction and treatment (20 to 30 years); minor air impacts from stripping towers.	Same as Alternative 3, plus minor air impacts from soil-vapor extraction system.	Same as Alternative 3, plus potential minor air quality impacts from incinerator emissions.

Table 3
(continued)

Assessment Factors	Alternative 1--No Action	Alternative 2--Containment Capping	Alternative 3--Containment, Onsite RCRA Landfill	Alternative 4--In-Situ Treatment, Vapor Extraction	Alternative 5--Treatment, Incineration Onsite
Long-Term Effectiveness and Permanence					
- Magnitude of residual risk	Significant risk remains from ground-water contamination of 300ug/l TCE onsite. Concentrations of 30 ug/l TCE are projected to occur in 100 residential wells in 10 to 15 years. Risk also remains from contaminated soil and buildings onsite, which may act as a continuing source of dust and ground-water contamination.	Environmental degradation would occur due to migration of contaminated ground water as described for Alternative 1. Potential exists for human exposures due to unauthorized use of contaminated ground water. Potential for risk from soils also exists should the cap fail.	After ground-water extraction and treatment is complete, aquifer will have 10ug/l TCE onsite and <5ug/l offsite. Potential exists for exposure to soil at 76,400 mg/Kg ($>10^{-1}$), or continued ground-water contamination should the landfill containment system fail.	Treatment of soil and ground water significantly reduces residual site risk. Residual TCE in soil = 64 - 600 mg/Kg (10^{-3} to 10^{-6}). Reduced potential for human exposure to soil and/or contaminant migration to ground water. Ground water will have 10ug/l TCE onsite, <5ug/l offsite.	After soils have been incinerated, minor risk remains from treatment residuals remaining onsite. TCE remaining in residuals <64mg/Kg ($<10^{-6}$). Ground-water will be restored to <5ug/l TCE.
			Reduces the potential for direct contact; prevents leaching of contaminants to ground water.		
- Adequacy of controls	No direct engineering controls to prevent exposure to contaminated soil and ground water; fence is susceptible to vandalism; annual inspection and repair is required.	Multimedia cap will reduce the potential for direct contact with contaminated soils and dust; leaching to ground water reduced, but not eliminated; capping is a well-established, proven technology; regular maintenance and inspection is required; cap will probably need replacement in 30 years.	RCRA landfill is a proven technology; annual inspection and maintenance required; ground water offsite will be restored to drinkable quality.	Multimedia cap reduces the potential for direct contact with contaminants remaining in soil; vapor extraction will significantly reduce contaminants in soil, but will require pilot testing; ground water offsite will be restored to drinkable quality.	Incineration is a proven technology; no long-term management of treatment residuals required.
	Ground-water monitoring will track plume movement, but will not remediate contamination.	Ground-water monitoring will track plume movement, but not remediate contamination.	Ground-water monitoring will verify the effectiveness of the extraction system.	Ground-water monitoring will verify the effectiveness of the extraction system, soil treatment, and cap.	Limited monitoring needed to verify ground-water restoration to <5ug/l.
- Reliability of controls	Sole reliance on fence and institutional restrictions to prevent exposure; high level of residual risk; further degradation of ground water likely.	Likelihood of failure is small as long as O&M is performed; risk from direct contact reduced; further degradation of ground water likely.	Likelihood of landfill failure is small as long as O&M is performed; ground-water monitoring needed to verify performance.	Cap failure unlikely; testing needed to verify performance of vapor extraction system.	Remedy will be highly reliable due to removal of material posing a risk.
Reduction of Toxicity, Mobility, or Volume	No reduction in toxicity, mobility, or volume, since no treatment employed.	No reduction in TMV of the soil contamination itself.	Same as Alternative 2 for soil; volume and toxicity of ground-water contamination almost completely remediated by extraction and treatment to 5ug/l offsite.	Toxicity and volume of contaminants in soil significantly reduced by treatment; ground-water contamination same as Alternative 3.	Toxicity and volume of soil and ground-water contamination almost completely eliminated; soil treated to $1x10^{-6}$, ground water to 5ug/l TCE.
Implementability					
- Technical feasibility	Fence is easily constructed; ground-water monitoring would be easy to implement and construct; spread of ground water plume would make remediation more difficult in the future.	Cap and alternate water supply are easily implemented. Spread of ground-water plume would make remediation more difficult to effect in the future.	RCRA landfill relatively easy to implement; staging of soil excavation required; monitoring needed to assess effectiveness of ground-water extraction/treatment; connection of residential wells to municipal water supply still feasible if extraction does not perform as expected.	Soil vapor extraction relatively easy to implement, requires some specialized equipment and specialists for startup; the technology has been demonstrated at sites with similar conditions. Ground water as described in Alternative 3.	Incineration would require special equipment and operators; residuals require testing to verify treatment effectiveness; the technology has been demonstrated at sites with similar conditions. Ground water as described in Alternative 3.

Table 3
(continued)

Assessment Factors	Alternative 1--No Action	Alternative 2--Containment Capping	Alternative 3--Containment, Onsite RCRA Landfill	Alternative 4--In-Situ Treatment, Vapor Extraction	Alternative 5--Treatment, Incineration Onsite
Implementability (cont'd)					
- Administrative feasibility	No offsite construction, therefore, no permits required.	Approval for water hook-up needed from municipal water authority.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
- Availability of services and materials	Services and materials locally available.	Same as Alternative 1.	Same as Alternative 1.	Services and materials available, some specialists required for construction and startup.	Mobile incinerator and operators needed; availability from two sources located 300 miles away.
Cost					
- Capital cost	$40,000	$5,610,000	$11,850,000	$10,680,000	$27,860,000
- O&M	$40,000	$50,000	$580,000	$1,600,000	$1,320,000
- Present worth	$200,000	$7,050,000	$16,185,000	$17,900,000	$35,660,000
Compliance with ARARs/TBCS					
- Compliance with ARARs	MCLs in ground water would not be attained.	Aquifer in excess of MCLs. Cumulative risk in excess of 1×10^{-4}.	All ARARS will be met.	All ARARS will be met.	All ARARS will be met.
- Appropriateness of waivers	Not justifiable	Not justifiable	Not required	Not required	Not required
- Compliance with criteria, advisories, and guidance	Does not meet state health department criteria for ground-water quality.	Same as Alternative 1.	Complies with state and local criteria and federal advisories.	Same as Alternative 3.	Same as Alternative 3.
Overall Protection of Human Health and the Environment					
- How risks are eliminated, reduced, or controlled	Risk of direct contact with contaminated soils controlled by fence; risk to human health from dust and ingestion of contaminated ground water is not controlled; environmental degradation will increase as ground-water contamination spreads and leaching from onsite soils continues.	Risk of direct contact with contaminated soils and dust controlled by multimedia cap; risk of ground-water ingestion controlled by alternate water supply and deed restrictions; contaminant migration from onsite soils to ground water controlled by cap but not eliminated; environmental degradation will increase as ground-water contamination continues to spread.	Risk of direct contact with contaminated soils and dust controlled by landfill cap; contaminant migration from onsite soils to ground water significantly reduced by landfill liner and leachate collection system; risk to human health and the environment from ground-water contamination significantly reduced by ground-water extraction and treatment.	Risk of direct contact with contaminated soils and dust significantly reduced by treatment of soil; risk from direct contact to contamination remaining after treatment controlled by multimedia cap. Contaminant migration from onsite soils to ground water significantly reduced by soil treatment and capping; risk to human health and the environment significantly reduced by ground-water extraction and treatment.	Risk of direct contact with contaminated soils and dust eliminated by treatment of soils to 1×10^{-6} risk level; risk to human health and the environment from ground-water contamination permanently eliminated by treatment of soils and ground water.
State Acceptance	To be addressed following public comment.				
Community Acceptance					

Table 4

SUGGESTED FS REPORT FORMAT

Executive Summary

1 Introduction
- 1.1 Purpose and Organization of Report
- 1.2 Background Information (Summarized from RI Report)
  - 1.2.1 Site Description
  - 1.2.2 Site History
  - 1.2.3 Nature and Extent of Contamination
  - 1.2.4 Contaminant Fate and Transport
  - 1.2.5 Baseline Risk Assessment

2 Identification and Screening of Technologies
- 2.1 Introduction
- 2.2 Remedial Action Objectives--
  Presents the development of remedial action objectives for each medium of interest (i.e., ground water, soil, surface water, air, etc.). For each medium, the following should be discussed:
  - Contaminants of interest
  - Allowable exposure based on risk assessment
  - Allowable exposure based on ARARs
  - Development of remedial action objectives

- 2.3 General Response Actions--
  For each medium of interest, describes the estimation of areas or volumes to which treatment, containment, or exposure technologies may be applied.

- 2.4 Identification and Screening of Technology Types and Process Options--For each medium of interest, describes:
  - 2.4.1 Identification and Screening of Technologies
  - 2.4.2 Evaluation of Technologies and Selection of Representative Technologies

3 Development and Screening of Alternatives
- 3.1 Development of Alternatives--
  Describes rationale for combination of technologies/media into alternatives. Note: This discussion may be by medium or for the site as a whole.

- 3.2 Screening of Alternatives
  - 3.2.1 Introduction
  - 3.2.2 Alternative 1
    - Description
    - Evaluation
    - Effectiveness
    - Implementability
    - Cost

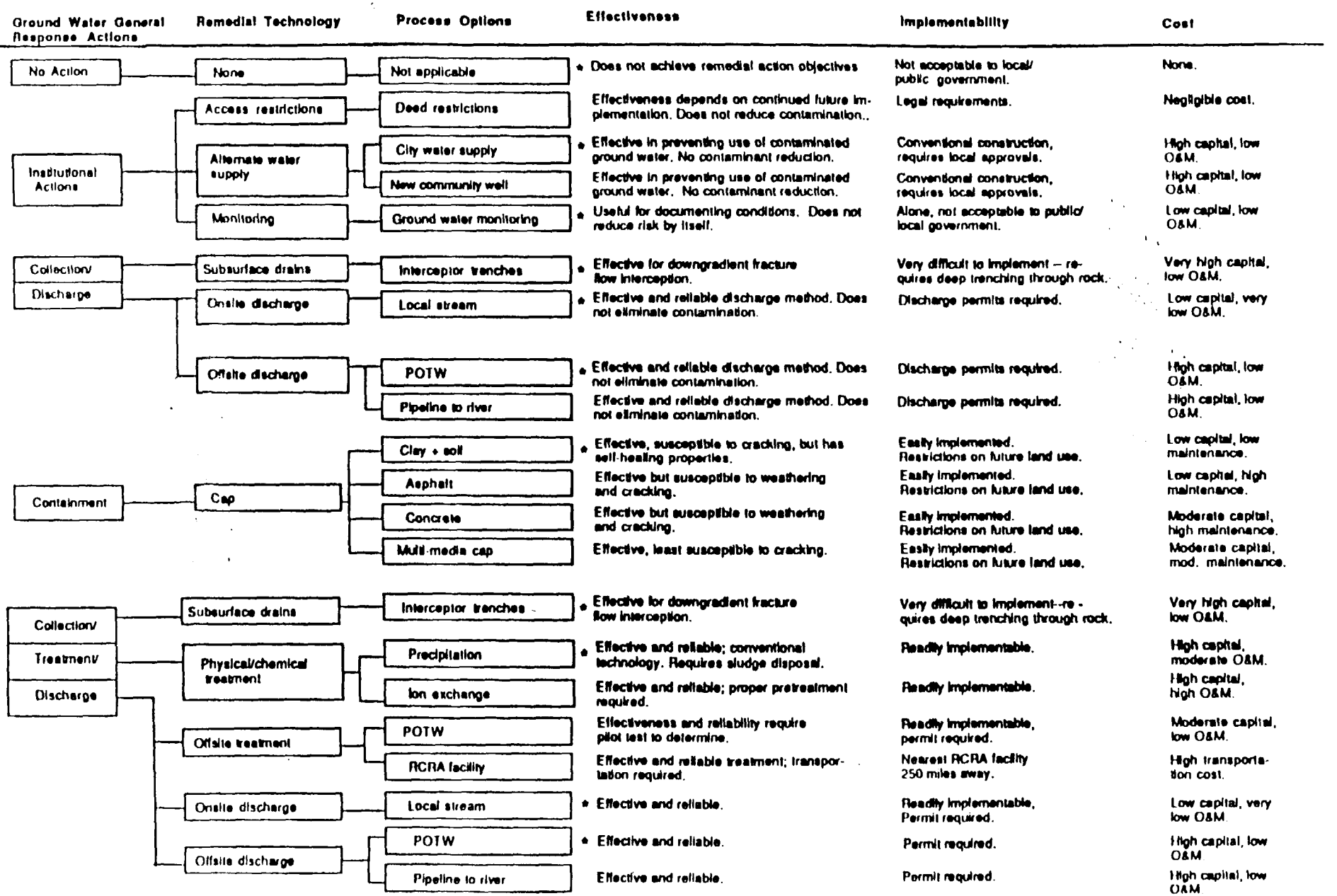
Table 4
(continued)

- 3.2.3 Alternative 2
  - Description
  - Evaluation
- 3.2.4 Alternative 3
- 3.2.5 Summary of Screening

4 Detailed Analysis of Alternatives
- 4.1 Introduction
- 4.2 Alternative Analysis
  - 4.2.1 Alternative 1
    - 4.2.1.1 Description
    - 4.2.1.2 Assessment
      - Short-Term Effectiveness
      - Long-Term Effectiveness and Permanence
      - Reduction of Mobility, Toxicity, and Volume
      - Implementability
      - Cost
      - Compliance with ARARs
      - Overall Protection
      - State Acceptance
      - Community Acceptance
  - 4.2.2 Alternative 2
    - 4.2.2.1 Description
    - 4.2.2.2 Assessment
  - 4.2.3 Alternative 3
  - 4.2.4 Summary of Alternatives Analysis
- 4.3 Comparison Among Alternatives
  - 4.3.1 Short-Term Effectiveness
  - 4.3.2 Long-Term Effectiveness and Permanence
  - 4.3.3 Reduction of Toxicity, Mobility, and Volume
  - 4.3.4 Implementability
  - 4.3.5 Cost
  - 4.3.6 Compliance with ARARs
  - 4.3.7 Overall Protection
  - 4.3.4 State Acceptance
  - 4.3.9 Community Acceptance
  - 4.3.10 Summary of comparisons among alternatives
- 4.4 Summary of Detailed Analysis

FIGURE 1

AN EXAMPLE OF THE EVALUATION OF PROCESS OPTIONS



* Selected representative technologies

FIGURE 2

ASSEMBLING A RANGE OF ALTERNATIVE EXAMPLES

GENERAL RESPONSE ACTION			1 NO ACTION	2 NO LONG-TERM SOURCE MANAGEMENT NEEDED, RAPID GW CLEAN-UP	3 TREATMENT AS A PRINCIPAL ELEMENT (10^{-6})	4 TREATMENT AS A PRINCIPAL ELEMENT (10^{-4})	5 TREATMENT AS A PRINCIPAL ELEMENT	6 SOURCE CONTAINMENT GW CONTROLS	7 SOURCE CONTAINMENT NO GW CONTROLS	8 CONTAINMENT (MINIMUM)
MEDIUM	TECHNOLOGY TYPE	AREA OR VOLUME								
SOIL	ACCESS RESTRICTIONS (FENCING)	ENTIRE SITE	●							
	EXCAVATION	ALL SOIL ABOVE 10^{-6}		●	●					
		ALL SOIL ABOVE 10^{-4}				●	●	●	●	
	DISPOSAL	ONSITE RCRA LANDFILL				●		●	●	
		ONSITE NON-RCRA LANDFILL			●		●			
		OFFSITE RCRA LANDFILL		●						
	TREATMENT ONSITE	ALL SOIL TO 10^{-6}			●					
		ALL SOIL TO 10^{-4}				●	●			
	TREATMENT OFFSITE			●						
	CAPPING	ENTIRE SITE								●
		ALL (REMAINING) SOIL ABOVE 10^{-6}				●		●	●	
GROUNDWATER	ALTERNATE WATER SUPPLY	ALL RESIDENTS IN AFFECTED AREA							●	●
	MONITORING	ALL MONITORING WELLS TWICE A YEAR	●	●	●	●	●	●	●	●
	COLLECTION WITH INTERCEPTOR TRENCHES	ALL WATER ABOVE 10^{-6} WITHIN 10 YRS	●		●					
		ALL WATER ABOVE 10^{-4} WITHIN 10 YRS		●		●		●		
		ALL WATER ABOVE 10^{-6} WITHIN 30 YRS					●			
	TREATMENT WITH PRECIPITATION ONSITE	TO 10^{-6}		●						
		TO 10^{-4}				●	●			
	DISCHARGE	ONSITE TO LOCAL STREAM		●	●		●			
		OFFSITE TO POTW				●		●		

Note: This is a conceptual example using the example of carcinogenic risk ranges; however, in general, when SCLs are available they will apply.